

The Typology of Settlement Development in Riverbanks in Pontianak

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Abstract – The development of Pontianak begins from the influence of the existence of the Kapuas River and its tributaries. The river used to be a space for community activities, with many houses and villages built based on their proximity to the river. The settlement grew to fill the land on the banks of Kapuas River first until they spread to its tributaries. This research aims to identify the typology of settlement development in riverside communities in Pontianak from time to time. This research employed a qualitative method with a comparative study. The researcher collected secondary data in the form of a map of the condition of settlements in Pontianak from time to time obtained from the historical records of Pontianak. Then, the data were compared and analyzed to obtain a typology of settlement development in the riverside communities in Pontianak. The study's results, namely the typology of settlements on the riverbanks in Pontianak, revealed the settlements that follow the structure of the riverbanks, ditch canals, and the settlements that lead to land roads. This can happen because of an increase in the number of people every year, accessibility range, and economic movement factors.

Keywords: *development, Pontianak, riverbank, settlement, typology*



The existence of rivers in an area has various benefits. The river bank serves as a place stopover, and the river as a transportation route for residents to distribute their goods to the city and its surrounding area (Garib & Noorhamidah, 2017). The river is used as a place of work, transportation, recreation, trade, and residence, which makes the river the fastest growing area (Syarif, 2018). River bank communities are very dependent on environmental conditions, namely rivers. Apart from being a source of life, a river is a place for activities and social interaction in the community. In choosing a strategic position in building a dwelling, the community refers to the proximity to activities and close to existing natural resources. Besides being a place to live, simple houses on riverbanks are a cultural characteristic of riverside settlements (Afdholi et al., 2019). The original settlement on riverbanks was due to transportation interests or needs for transportation and water availability. The river is the boundary or the first area to receive influence from the outside, so it has a very open nature and is

vulnerable to change. One may say that the existence of the river is a vital part, closely related to community activities.

Urban development must happen in every city, whether fast or slow (Willyanto et al., 2022). Development of settlements on the waterfront in Pontianak started from Kapuas River. Geographically, this river is one of Indonesia's longest rivers, stretching widely throughout the West Kalimantan region (Purmintasari & Kusnoto, 2018). The city of Pontianak is dubbed the city of "A Thousand Rivers" due to its geographical conditions, where the Kapuas River has 33 main rivers and 11 tributaries (Simbolon, 2019). Pontianak had a population of 658,685 in 2020 and will increase yearly (BPS Kota Pontianak, 2021).

The river is the lifeblood of the people on Kalimantan. Rivers in the past used to be a very high-activity space. Active transportation and trade routes were daily routines. Settlements first grew to fill the Kapuas riverbanks (main river) land, then spread to its tributaries. The Kapuas River has a role as a means of transportation and a source of life. The transportation system plays an essential role in human life; human, economic, and social civilization (Edward, 1991). Later on, the developments in the riverbank area were in the form of ease of mobility that made it easier for economic and socio-cultural activities, making the activities on the riverbanks have a significant historical value (Sairinen & Kumpulainen, 2006). This created a community life pattern in the past to be strongly influenced by Kapuas river and its tributaries. This led people to build houses and villages based on their proximity to the river.

The river is a potential source to be used as a residential center. The existence of the river also affects the formation of a riverbank area structure to meet the community's needs (Mentayani, 2019). Settlement is the scope of the distribution area of the resident population according to the circumstances of a particular geography. A growing settlement always follows the existing river path, with an elongated pattern around the river or a pattern of clustering and spreading to form a settlement group. A waterfront area can be formed from space, time, and occupants (Timur, 2013). Aspects that can affect the riverside settlements are both physical and non-physical (Hamidah et al., 2016). Condition and nature, along with human activities on these riverbanks, can form a landscape of waterfront areas with a relatively long process. The topographical aspect causes the layout and direction of the development of waterfront settlements in the forms of inland water villages, outward water villages, parallel water villages, water villages, and river mouth water villages (Hassan, 2010).

The development of settlements on the Kapuas riverbank in Pontianak has grown for almost two and a half centuries (Nurhidayati & Fariz, 2020). This led to a significant impact on the city of Pontianak. Growth and development in urban areas and the increasing demand for land mutually influence each other. This city became a trade and business area at that time as the central to controlling the entry and exit of goods. The existing port could accommodate local and foreign immigrants. The sea and river routes were the most critical access at that time, so the development of this city also developed based on the river route. The physical condition of settlements along the river, both natural and artificial, has an immense contribution to the city's shape (Garib & Noorhamidah, 2017). The development of the area, especially building and land planning, is very prominent. As a result, the need for land routes is increasing and inadvertently changing the pattern of activity and the need for choosing the location of houses, markets, warehouses, and others that no longer have direct access to the river.

Three theories can help to see changes in urban layout design (Trancik, 1986). One of them is figure-ground. The figure-ground theory explains a textural relationship between the built form (building mass) and open space (open space). The figure-ground analysis is an excellent tool for identifying a texture and patterns of an urban layout (urban fabric) and the problem of urban mass/space irregularity. The texture pattern of a place is fundamental in urban design and can technically be regarded as the basis for gathering information. This can describe a match between the organization of physical space and social space. In addition, the figure-ground theory is used to identify urban forms by analyzing the relationship between building mass and urban open spaces. This figure-ground analysis can show the patterns of development that occur in the area. Solid and void configurations, mass planning, and urban combinations can be arranged in such a way as to produce the desired spatial geometric patterns (Trancik, 1986). So, in the end, we have a typology of the development of waterfront settlements, especially in this city. Typology is the study of types with taxonomic and classification of activities to produce type categories to see diversity and uniformity

(Krier, 1979). In addition, typology emphasizes concepts and consistency so that it can be easier for the public to be more familiar with the parts of architecture, which can be supported by an understanding of scale and identity (Chilmy, 2013).

Research conducted a previous study that discussed settlement development patterns with a case study on the Deli River and Medan Labuhan District banks by Marpaung and Sembiring (2020). This research was motivated by the increasing population growth in Medan, which resulted in the location of settlements. The purpose of this research was to know the typology of residential areas on the Deli riverbank, Medan Labuhan District, and the context of the concept of settlements on the Deli riverbank. The method used in this study is a qualitative method with observation and interview data collection. The results obtained that the development of the Deli riverbank, Medan Labuhan District, for the typology of residence divided into series houses, floating houses, and apartments or flats. The forms of settlement patterns consist of clusters, linear, and combinations. Then, the second research by Putro and Nurhamsyah (2015) with a case study in the villages of Sepuk Laut, Punggur Besar, and Tanjung Saleh, Tanjung Saleh District, Kubu Raya Regency. This research is based on how the community adapts to the environment to form a settlement pattern. Based on this, this study uses a qualitative method with a rationalistic approach. This research focuses on conducting a characteristic-related study of the settlement pillars viewed from the stages of development, the structure of the settlement pattern, density, orientation, and quality of the building, as well as the topography of the settlement. The third study took a case study on the riverbanks in Sasirangan Village, Banjarmasin, by Mentayani and Hadinata (2018). This research is based on the times and progress in all fields so that the existence of riverside villages undergoes a transformation that threatens to fade the identity of riverside architecture in Banjarmasin. The method used in this research is qualitative for secondary data interpretation and a quantitative approach for identifying dwellings and building elements. This study aimed to determine the characteristics of the Sasirangan village related to architectural characters, residential components, and non-physical devices. Subsequent research was conducted by Sastika and Yasir (2017) with a case study on the settlement on the Musi riverbank. This research is based on a question about the characteristic form of settlements on the Musi riverbank, Palembang City, regarding social, economic, and environmental aspects. The method used in this research is qualitative with a naturalistic paradigm. The result of this research is characteristic of settlement patterns on the Musi riverbank by looking at the structure of the settlement pattern, which was initially a settlement pattern that rotated on the Musi river and then changed along with the development of infrastructure.

Based on previous studies, many methods are used to identify the settlement patterns on riverbanks in various locations. Previous research mostly used qualitative methods. This research entitled "Typology of Settlement Development in Riverbanks in Pontianak" aims to identify and determine the typology of settlement development in river bank communities in Pontianak from the Kingdom and Sultanate periods, Dutch Colonial period, to the Post Independence period. The data is based on historical records using a literature review and maps of Pontianak. The research approach used in this study is a comparative approach and a synchronic and diachronic approach. This is a distinguishing element from previous studies.

II. METHODOLOGY

The method used in this study is a qualitative method with a literature review approach to historical developments from previous studies to find in sequence the developmental events that occurred in Pontianak. This is primarily in the physical city and can be displayed on the timeline of historical development from previous research. Then, it proceeds with a comparative study. A comparative study is descriptive research to examine the causal factors in certain situations (Sugiyono, 2013). This method is used to compare the data drawn to new conclusions. The location observed is Pontianak, a city formed by the geographical condition/topography of the river and the values of the cultural diversity of its people. The city of Pontianak is divided into three areas separated by Kapuas River and Landak River. It has six administrative areas: Pontianak City, West Pontianak, North Pontianak, East Pontianak, South Pontianak, and Southeast Pontianak. Three regions, divided by the river, are determined to limit the research. The regions are Segment A (consisting of North Pontianak), Segment B (consisting of East Pontianak), and Segment C (consisting of Pontianak City, West Pontianak, South Pontianak, South Pontianak, and Southeast Pontianak).

In this research, the main question is about the typology of settlement development in riverside communities in Pontianak City. This study aims to identify the typology of settlement development in river bank communities in Pontianak City from the Kingdom and Sultanate period, Dutch Colonial period, and Post-Independence period. This research began with the collection of secondary data in the form of maps of settlement conditions from the Kingdom and Sultanate period (1771-1808), the Dutch Colonial period (1885-1895), the Post-Independence period (1967-1983), obtained from the dialogue findings of literature reviewing the history of the development of Pontianak City. All collected data is then compiled into a comparative table (comparison) to analyze the solid void pattern so that it can see settlement development conditions in Pontianak City river bank communities. Then, it was concluded about the typology of settlements in river bank communities in Pontianak City. This study used a synchronic and diachronic approach to look at the events between periods and three periods to verify and validate the findings.

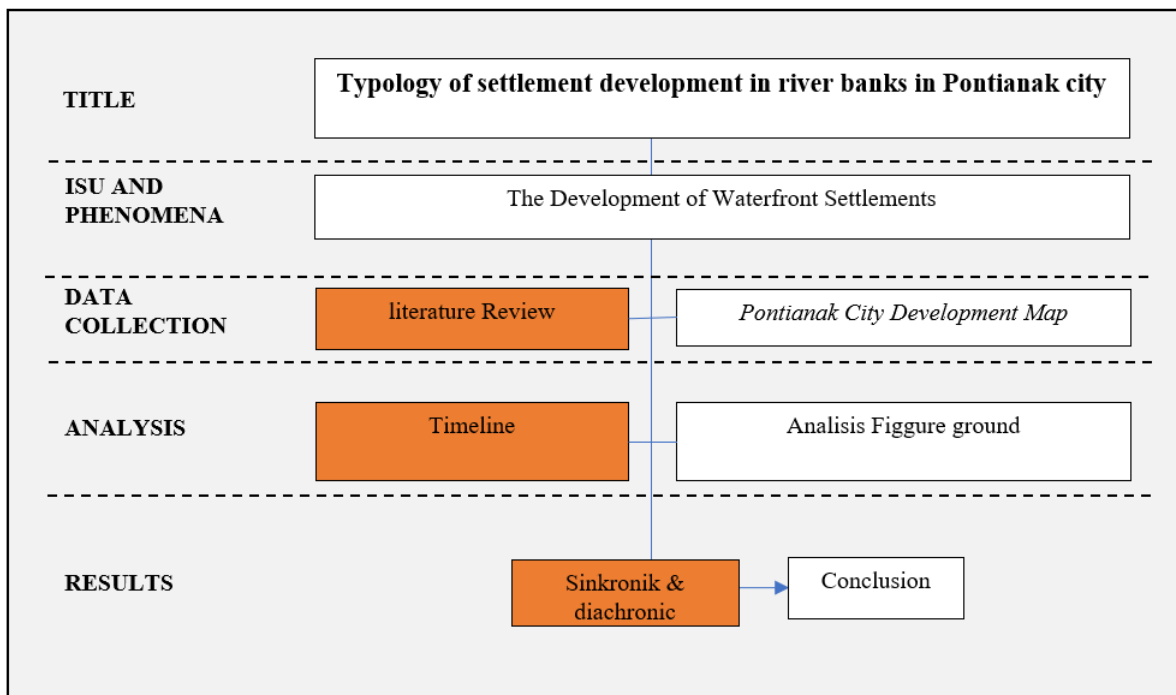


Fig. 1. Research Flowchart

III. RESULTS

This research is based on historical data from the establishment of Pontianak from 1771 to the present. The data, state documents, artifacts, and historical relics prove culture's role in the past. The researcher periodized the research time phase to focus more on the research. The period of the observation period is not the same because the specified period is the historical period of the development of Pontianak, namely the Kingdom and Sultanate period from 1771-1808, the Dutch colonial from 1885-1895, and the Post-Independence period from 1967-1983. The observation periods were determined to fathom the transformations that occurred in Pontianak. Each of these periods has a monumental historical record of the development of river cities and local cultural characteristics, so there tends to be a significant change. These maps are the basis for analyzing the figure-ground for waterfront settlements in Pontianak. Analysis of each observation period was carried out to obtain more significant data and information on the city's development as a whole (physical and non-physical), so the river city development and change are traceable.

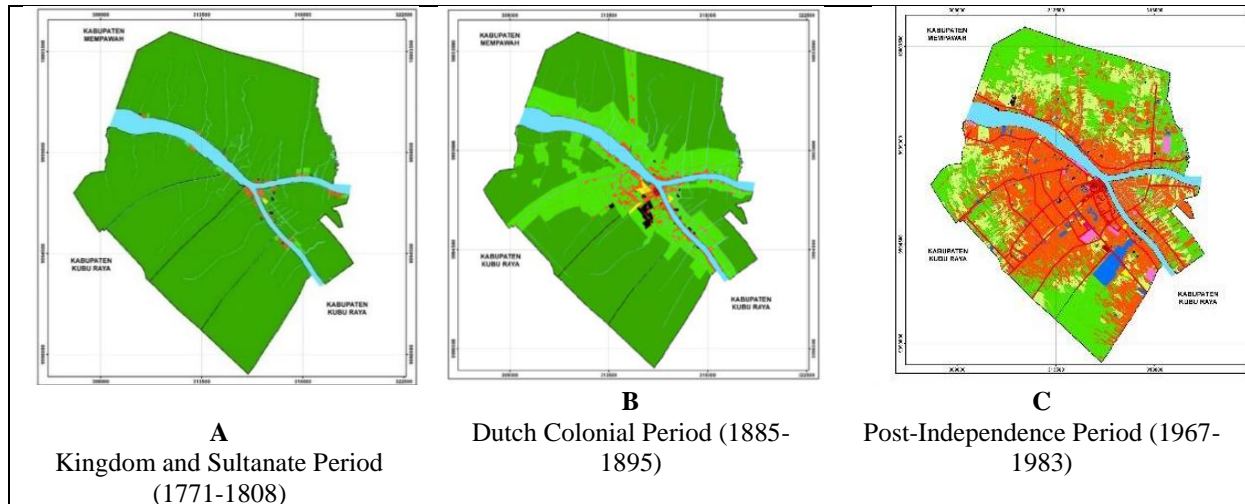


Fig. 2. Map of the Distribution of Settlements in Pontianak
Source: (Nurhidayati & Arianti, 2021)

The map is divided into three segments to facilitate the process of data collection and analysis. These segments are divided into three areas divided by Kapuas river. Segment A consists of the North Pontianak Area, Segment B consists of the East Pontianak Area, and Segment C consists of the Pontianak City Area, West Pontianak, South Pontianak, and Southeast Pontianak.



Fig. 3. Research Area Segments

A. Literature Review Analysis of the Development of Pontianak

This section contains an analysis of the development of the Pontianak settlement that occurred based on previous studies starting from the Kingdom and Sultanate period, the Dutch Colonial period, and the Post-Independence period. It began in the 1770s, before the establishment of the Pontianak sultanate. Pontianak was a forest passed by a river with natural trench branches. These natural trenches were later optimized and normalized under Dutch Colonial rule (Saputra, 2021, April 12). Usman (2016) added that in the year before 1771, before settlement existed, Pontianak was filled, then grew and started occupied by people from various ethnicities. Then in 1772, the Chinese started developing the Siantan village next door north the palace, and the Dayaks began setting up a village in the Ambawang River area, far from the palace. Residential development grew in the area coast river for more reach water sources and pathways for transportation (Irfan, 2020). The developments at this time were the period of the kingdom and sultanate in Pontianak.

Sourced from the Pontianak City Government (2018, November 19) in 1778, the VOC negotiated with the Sultan of Pontianak to obtain an area in the southern part of Kapuas River or the area opposite the Pontianak Palace. This area is called *Verkendepaal* (*tanah seribu*). The arrival of VOC began the first step of construction on the *Verkendepaal* by opening trenches and building *gertak*. The structure of the trench and *gertak* consisted of Sungai Jawi and *gertak dua* in the western part. A small Kapuas river parallels trench and *gertak satu* in the northern region, a large trench and a *gertak empat* in the eastern part, and a ditch on the side of the *pelmenlaan* and *gertak tiga* in the southern part. In addition to trenches and *gertak*, there was the construction of new walls, trade representative offices, and settlements and places of activity for the Dutch people near the fortifications (Usman, 2016). Then in 1779, Usman (2016) argued, the Netherlands started a canal construction project to overcome floods due to the Kapuas River's tides and began settling and establishing a permanent office in 1818 (Heidhues, 2018). Along with the development of time, the existence of the Kapuas River became the main generator of the city's growth linearly and spread on the riverbanks. The trench became a secondary movement system while the land movement route was built to connect the pier with the market and fortifications. At this time, aspects of the movement of water transportation were more influential as the basis for forming spatial patterns (Bayu, 2007).

Pontianak continues to grow. Some things that mark Pontianak have developed. Pontianak became an international free port in 1834 (Usman, 2016), and villages such as Saigon and Banjar Serasan were formed between 1846-1884 (Sirrullah, 2019). In 1856, the Dutch made a new treaty between the colonial government and the sultanate on expanding the Dutch colonial dominions. The development of settlements was also increasing, as seen by many traders from Bugis, Bangka Belitung, Serasan, Tambelan Sampit, Kamboja, Bali, Malay, and so on (Hasanuddin & Kristanto, 2001). They settled down and opened new settlements along the Kapuas River. The importance of the trench for the people of Pontianak can be seen in the names of the area or road that bear the name of the trench (RCUS, 2015). In 1889, there were two centers of commercial activity, namely the Kapuas Riverbank market and the large trench bank market. The Kapuas riverbank market is a market to the north of the river. This market is in the Chinese community and was founded because of their settlements. The large trench bank market is the market to the south of the Kapuas River. The Dutch founded this market by inviting immigrants from China to establish settlements and carry out economic activities in the region (Bayu, 2007). The existence of this market has led to the growth of building blocks no longer tied to topographical conditions. These buildings were constructed on a grid-shaped street. This combination of water and land movements expands in tandem.

In the early 1900s, there was urbanization or migration of Malays and Chinese people to Pontianak City. This happened as Pontianak was the center of the West Kalimantan government, a trading and port city (Nurcahyani et al., 1999). In addition, the population in Pontianak in 1905 was 17,000 consisting of indigenous people (Javanese, Malay, Bugis, etc.) for 64%, Chinese 32%, Arabs 2%, Europeans 1%, and others 1% (Yusriadi, 2019). Gradually, Pontianak became a bustling small town with streets, night lighting, and other public facilities.

Infrastructure in the Post-Independence period was growing, and movements or roads were formed with a grid pattern. The urban physique grew up in the city's dynamism as a riverside city. However, during this period, the community began to abandon the orientation of the trench to the road (Bayu, 2007). Activities in the trenches of Pontianak, such as lifting goods by boat, were still seen in the 1960s. The city's development began to abandon its character as a riverside city. The movement of water transportation was an early original movement, and the land movement was a generator of regional growth. The movement of land is getting more and more time to condense. The area of water movement began to be covered with buildings and infrastructure of land movement (Bayu & Susanto, 2013). The city's development began to abandon its character as a riverside city. Infrastructure such as a bridge has not been able to accommodate the volume of vehicles passing by (Irfan, 2020).

The analysis of this literature review suggests a comprehension that Pontianak experienced settlements development every period. The development of this settlement occurred due to several factors, namely what was marked by Pontianak City as the center of government. There were socio-cultural factors in the form of villages of various tribes and ethnicities, commercial activity centers, urbanization, and infrastructure development. This is the determinant in the pattern of the formation of riverbank space in Pontianak.

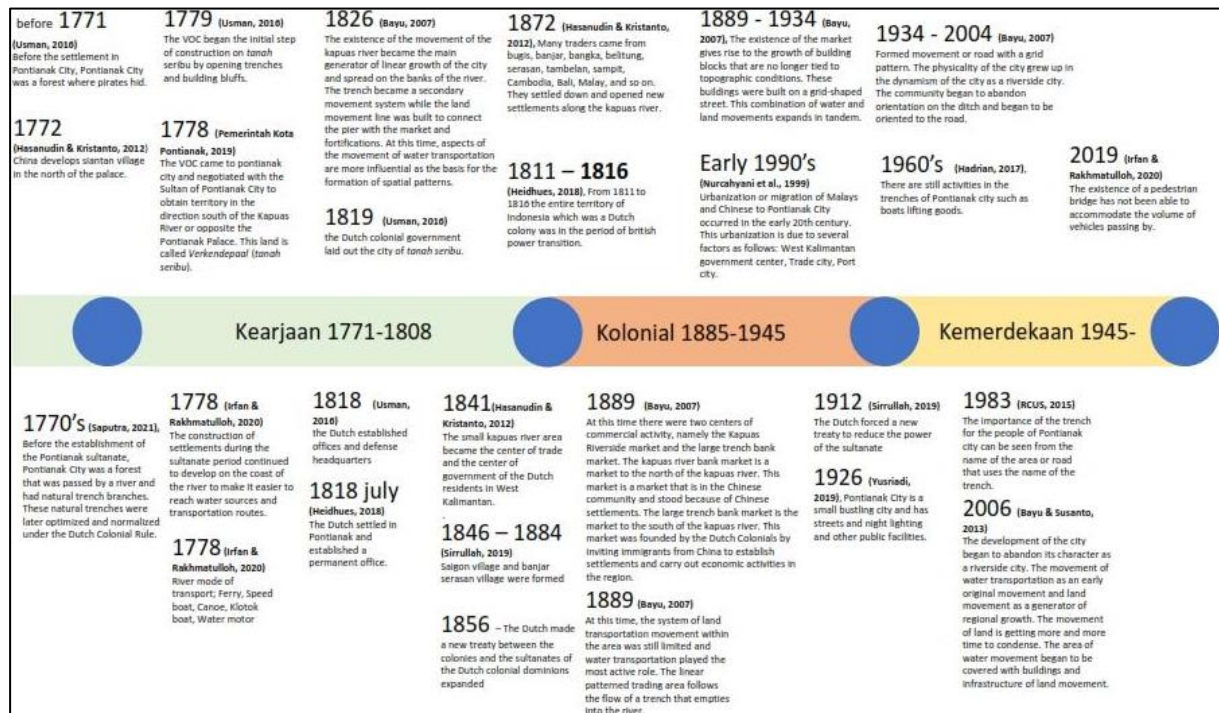


Fig. 4. Timeline of the Development of Pontianak

B. Figure-Ground Analysis

This section will analyze the Pontianak figure-ground from time to time. Figure-ground analysis was carried out according to the observed periods: the Kingdom and Sultanate period from 1771-1808, the Dutch colonial from 1885-1895, and the Post-Independence period from 1967-1983. The figure-ground analysis is used to see land and residential characteristics to see the patterns of settlements in Pontianak.

During the Kingdom and Sultanate period of 1771-1808, most Pontianak land areas were still forest. Less than five percent of the land was used, and the rest of it was forest land. The land used was concentrated in the riverside area. The development of land use was evenly distributed in three segments. For residential characteristics from the Kingdom and Sultanate period from 1771-1808, many settlements were found on the Kapuas riverbank, especially in the river segment around the branching of the Kapuas and Landak rivers. Ditches and creeks were formed naturally and had the potential for developing settlements upstream following the path of the ditch or tributary. This analysis can be seen in Fig. 5.

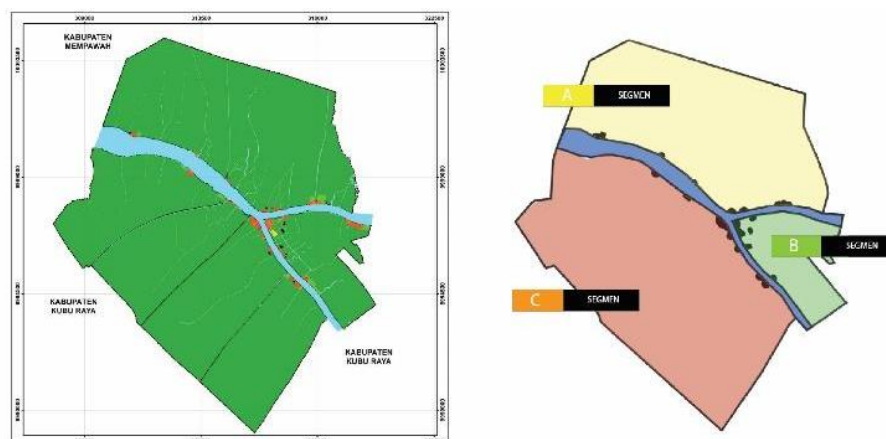


Fig. 5. Figure Ground Analysis during Kingdom and Sultanate Period (1771-1808)

For the Dutch Colonial period of 1885-1895, almost all the land on the riverbanks was used. There were still some parcels of forest land on the riverbanks. Land use in segment C starts upstream and follows the trench line. Characteristics of residential are developed towards the upstream. Settlements in segment C developed three to seven blocks (road layer) upstream. Meanwhile, segments A and B still tended to be on the riverbanks, at least two blocks from the river. The existence of a trench made developments upstream faster. In segment A, there were one to two ditches where settlements began to grow. In segment C, there were three or five ditches where settlements started to grow. While in segment B, there was no significant growth of settlements oriented to the ditch. The figure-ground analysis of the Dutch Colonial period can be seen in Fig. 6.

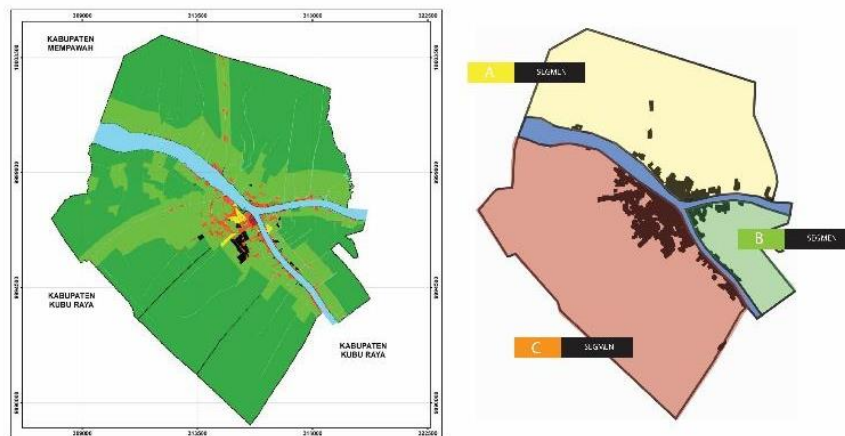


Fig. 6. Figure Ground Analysis during Dutch Colonial Period (1885-1895)

Then in the Post-Independence period from 1967-1983, the remaining forest land was no more than ten percent of the total land area of Pontianak. All land on the riverbanks was filled with residential land. Settlements in segment C developed ten to fifteen blocks (road layer) upstream. Settlements in segment A start upstream and develop four to six blocks upstream. Meanwhile, segment A was only two to three blocks from the river. The settlements on the edge of the main ditch on segments A and C began to fill up so that the settlements shifted towards the ditch canals or on the road. The significance of settlement development in segments A and C, which was higher than in segment B, was due to a trading center in segment A and especially in segment C. The figure-ground of the Post-Independence period analysis can be seen in Fig. 7.

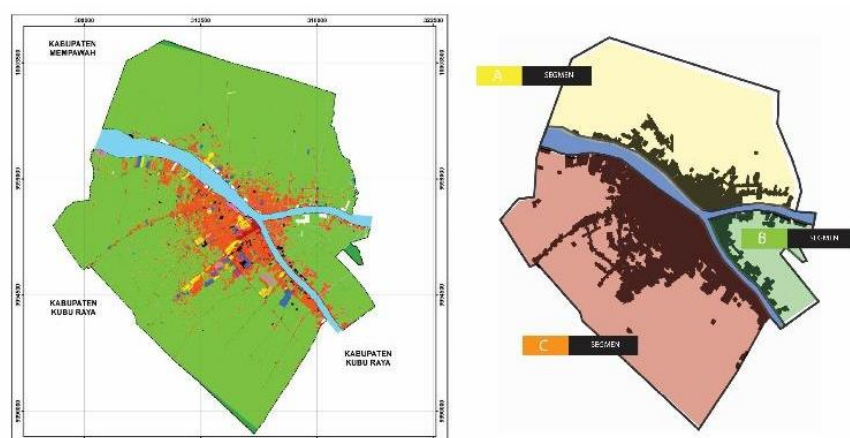


Fig. 7. Figure Ground Analysis during Post-Independence Period (1967-1983)

The analysis of the figure-ground carried out in three stages of the development of the Pontianak spatial pattern reveals that the characteristics of land and settlements indicate the initial distribution of settlements in Pontianak located in the riverside area. At the beginning of the city formation in 1771-1808, the area with the most settlements was located only on the riverbanks, and there was still a lot of forest land. Then, the settlement development in the Dutch Colonial period from

1885-1895 increased along with the increase in population by filling parts of tributaries and ditches and developing transportation facilities such as land roads. In the Post-Independence period from 1967-1983, it became increasingly apparent that settlements were getting denser and slowly moving away from waterfront areas. The significance of the growth of waterfront settlements occurs more in segments A and C because this area was a trade center for Pontianak.

C. Typology of Settlement in Riverside Communities in Pontianak

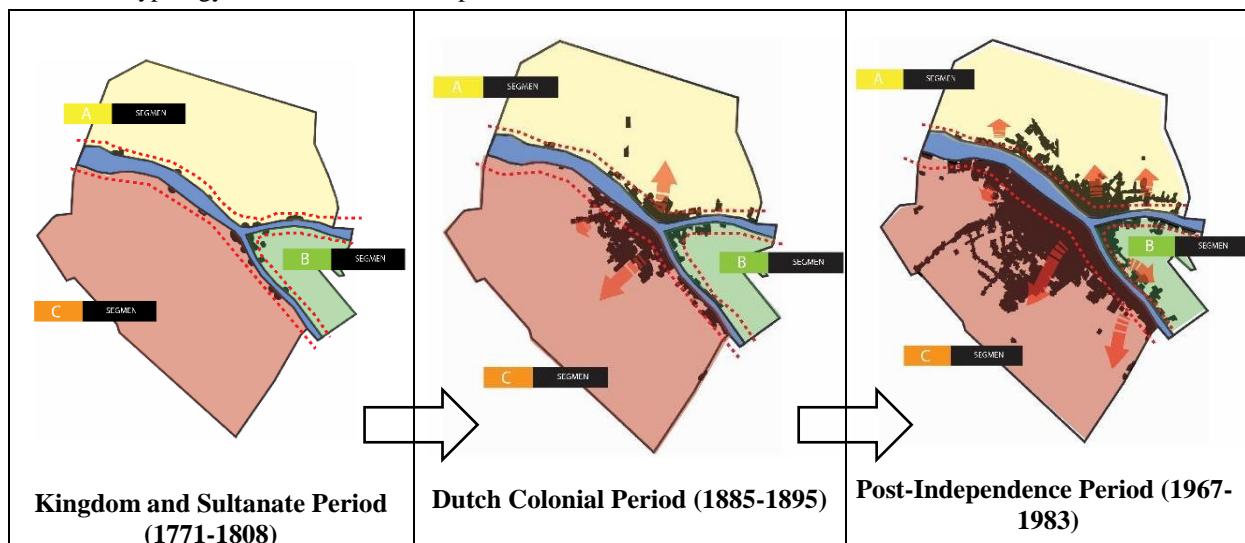
1) Synchronic Analysis

The comparison results per observation period advised that the typology of riverbank community settlements in Pontianak be settlements following ditch canals and the one leading to land roads. In the period of the kingdom and the sultanate from 1771-1808, the development of settlements tended to be linear, following the riverbanks. Meanwhile, the settlement development was mainly found in the branching area between Kapuas and Landak rivers. However, there were still no settlements on the mainland then. Access difficulty due to forest land was the main factor for no settlements on the mainland. The literature review in the previous section suggests that before the 1771s, the land in Pontianak was still dominated by forests and only a place for pirates to live (Saputra, 2021, April 12; Usman, 2016). Then, it developed, filled with people of various ethnicities, and formed a riverside village.

In the Dutch Colonial period from 1885-1895, settlements began to develop by adding village blocks from the river. Settlements on the riverbanks were getting denser and slowly growing towards the mainland, moving away from the river and spreading to the tributaries. It's gradually showing the patterns of settlements spread over the land. As the literature suggests, land infrastructure began to develop in the Dutch Colonial period. This can be seen from the development of road infrastructure in the form of bluffs scattered in various regions, the development of new settlements, and the existence of a center of economic activity near the Kapuas River, resulting in the development of building blocks that form a grid pattern (Bayu, 2007; Hasanuddin & Kristanto, 2001).

Consequently, in the Post-Independence period from 1967-1983, the riverside residential area was densely packed and formed a spreading pattern. Settlements on the riverbanks were already very dense, followed by settlements on the mainland were the same. The pattern of settlement began to spread following the direction of transportation on the mainland. Table 1 shows the typology of settlement development on riverbanks in Pontianak from time to time. In the literature studies, the infrastructure was more developed in this period and formed a grid pattern with a dynamic urban physique. Population growth was also increasing, resulting in settlements away from riverbanks (Bayu, 2007; Bayu & Susanto, 2013).

Table 1. Typology of Settlement Development in Riverbanks in Pontianak



2) *Diachronic Analysis*

The typological analysis suggests that the development of Pontianak from the Kingdom and Sultanate periods from 1771-1808 to the Post-Independence period from 1967-1983 showed a significant use change and caused the accumulation of activities on land. The literature review also strengthens that Pontianak has experienced development from time to time. At first, Pontianak was only a land area and began to develop along with the existence of activities, population growth that increased every year, which resulted in an increase in settlements and the need for adequate infrastructure (Bayu, 2007; Bayu & Susanto, 2013; Hasanuddin & Kristanto, 2001; Nurcahyani et al., 1999; Saputra, 2021, April 12; Usman, 2016).

Settlements always grow following the existing river path, with an elongated pattern around the river and a grouping and spreading pattern to form a group. Developments, especially building and land planning, are very prominent. The need for pathways is increasing and inadvertently changing the pattern of activity and the need for choosing the location of houses, markets, warehouses, and no longer access to rivers. Due to the development of settlements further away from the river flow, the pattern of settlements on the mainland is also growing. Rivers for local people were not the main transportation route to get to the other areas, so residents started to stay away from the river.

The development of buildings and changes, as well as the addition of land changes and the addition of land roads, made the city of Pontianak not as usual in using river access and no longer prioritizing buildings facing the river. This significantly changed the value of local wisdom on the city's identity and the city image in the past. The river's existence dramatically influenced the people's lives of Pontianak in the past. Their activities were inseparable from the river; it was the main transportation route to get out of the city or the area. Also, accessibility is one indicator to see the pattern/direction of a city's development.

IV. CONCLUSION

Pontianak is a rapidly-growing city. A city with its unique natural form of a river played a vital role in the early days of its existence. The river bank settlements in Pontianak have become part of the history of the city's development. Based on the results of the discussion on the analysis of the typology of settlement development in river bank communities in Pontianak City, the conclusion is as follows:

- a. The comparison between previous studies and figure-ground analysis demonstrates the typology of the settlements on the river bank in Pontianak, consisting of settlements following the river structure, settlements following the canal of the moat, and leading to the road.
- b. The development of settlements in Pontianak can occur due to the factors of Pontianak being the government's capital of West Kalimantan, as a center of economic activity, and having easy water transportation accessibility at that time marked by the presence of a port. This is an attraction for people outside Pontianak to settle down and form settlements in Pontianak City, resulting in a shift in settlement orientation that is increasingly moving away from the riverbank.

These things cannot be avoided due to the increasing need but can be controlled by enforcing regulations for watersheds. These regulations regarding the watershed can protect the existence of the Kapuas River and other tributaries so that the identity of Pontianak City, which was once a city of a thousand rivers, is well maintained.

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